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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/761,409

01/22/2004

Steven E. Hill

78815(135-1 US)

3319

27975

7590

01/23/2006

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EXAMINER

NGUYEN, TUAN H

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 01/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/761,409	HILL ET AL.	
	Examiner	Art Unit	
	Tuan H. Nguyen	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 and 56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 and 56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>6/04, 2/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 10 is objected to because of the following informalities: In claim 10, line 2, "III-I" should be changed to -- III-V --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims 22-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 22 is incomplete since an independent claim can not depend on another independent claim. The structure of claim 1 should be recited in this claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7, 8, 16-18, 22-23, 56 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kenyon et al. (cited by applicant).

Kenyon et al. in an article entitled: « Luminescence from erbium-doped silicon nanocrystals in silica : Excitation mechanisms », pages 367-376, particular on page 368, section II. EXPERIMENT, first paragraph discloses an Erbium-doped silicon

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nanocrystal layer in silica (group IV silicon dioxide layer) containing 1 at. % erbium on a silicon wafer; and continued on page 369, section III. MODEL, last 7 lines, Kenyon et al. concludes that "both nanocrystals and erbium are uniformly distributed throughout the film" when formed by PEVCD.

Since the same process is used to form the layer, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to have recognized that the rare earth elements are dispersed on the surface of the semiconductor nanocrystals and distributed substantially equally through the thickness of the group IV oxide layer.

With respect to claims 3-4, Kenyon et al. discloses on page 368, in the EXPERIMENT section, line 11, the film thickness is in the range 1-3 micron which includes the claimed ranges.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12, 16-21, 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Background of the invention in view of Kenyon et al..

Background of the invention, pages 1-5 of the instant specification, discloses substantially the claimed doped semiconductor nanocrystal layer except the use of PECVD for forming Er-doped silicon rich silicon oxide layer.

Kenyon et al. in a related article entitled: " Luminescence from erbium-doped silicon nanocrystals in silica: Excitation mechanisms", pages 367-376, particularly on page 368, section II. EXPERIMENT, first paragraph discloses an Erbium-doped silicon nanocrystal layer in silica (group IV silicon dioxide layer) containing 1 at. % erbium on a silicon wafer.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the teachings from Kenyon et al. in the conventional art as disclosed in the Background of the invention since it would form a layer with "both nanocrystals and erbium are uniformly distributed throughout the film" when formed by PEVCD (page 369, section III. MODEL, last 7 lines, Kenyon et al.). This would inherently includes the Er being dispersed on the surface of the semiconductor nanocrystals.

With respect to the thickness, and concentration ranges as claimed in claims 5-6, 11-12, and 20-21 respectively, they are considered involve routine optimization while has been held to be within the level of ordinary skill in the art as noted in In Re Aller, the selection of reaction parameters such as temperature and concentration would have been obvious:

"Normally, it is to be expected that a change in temperature, or in concentration, or in both would be an unpatentable modification. Under some circumstances,

however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are terms "critical ranges and the applicant has the burden of proving such criticality... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948).

Therefore, one of the ordinary skill in the requisite art at the time the invention was made would have used any suitable thickness ranges and the concentration ranges in order to optimize the result.

With respect to claims 9, 10, 18-19, since the group II-IV, III-V, or rare earth element in the form of an oxide or a halogenide is well-known and commercial available, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the material for forming the doped layer.

Claims 13-15, 22-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Background of the invention in view of Kenyon et al. as applied to claims 1-12, 16-21, 56 above, and further in view of Zacharias (WO 02/061815, cited by applicant).

The combination of Background of the invention and Kenyon et al. discloses substantially the claimed structure except the superlattice structure as claimed in claims 22-31, and the nanocrystal size as claimed in claims 13-15, and the ITO layer.

Zacharias in a related semiconductor structure as shown in figs. 1-10 and related text, discloses the supperlattice structure of the doped semiconductor nanocrystal layers 10 having the thickness of from 1 to 10 nm (see claim 1), and the dielectric layers 18 of oxide or nitride having thickness of relatively thin, in nm range (see pages 13-14); the semiconductor nanocrystal size are from 2-3 nm (see page 20, second and third paragraphs); fig. 9 and related text on page 17 shows the supperlattice structure including ITO layer as a current injection layer.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the nanocrystal layer disclosed by Background of the invention and Kenyon et al. into a supperlattice structure so-called MOS structure as suggested by Zacharias for used in electronic circuit.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-31, 56 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-10, 32-37 of copending Application No. 10/761,275. Although the conflicting claims are not identical, they are not patentably distinct from each other because the doped semiconductor nanocrystal layer as claimed is broad enough to include the doped semiconductor powder as claimed in claims 1-10, 32-37 of the copending Application No. 10/761,275.

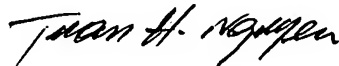
This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kear et al. discloses a nanostructured RE-doped SiO₂-base material.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan H. Nguyen whose telephone number is 571-272-1694. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Tuan H. Nguyen
Primary Examiner
Art Unit 2813